

**FILED**  
 2011 APR 28 P 2:59  
 RICHARD W. WIEKING  
 CLERK, U.S. DISTRICT COURT  
 NORTHERN DISTRICT OF CALIFORNIA

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ATTORNEYS FOR PLAINTIFF AND THE PUTATIVE CLASS

**UNITED STATES DISTRICT COURT  
 NORTHERN DISTRICT OF CALIFORNIA**

ARUN GUPTA, individually and on  
 behalf of all others similarly  
 situated,

Plaintiff,

v.

APPLE, INC., a  
 California corporation,

Defendant.

Case **CV 11**

**2110**

**COMPLAINT FOR:**

- (1) Violations of the Stored Communications Act, 18 U.S.C. § 2701, *et seq.*
- (2) Violations of the Electronic Communications Privacy Act, 18 U.S.C. § 2510, *et seq.*
- (3) Violations of California's Unfair Competition Law, Cal. Bus. & Prof. Code § 17200
- (4) Unjust Enrichment
- (5) Breach of Fiduciary Duty
- (6) Breach of Contract

**DEMAND FOR JURY TRIAL**

**CLASS ACTION**

COMPLAINT

**FAXED**

1 Plaintiff Arun Gupta ("Plaintiff"), by and through his attorneys, upon personal  
2 knowledge as to himself and his own acts, and upon information and belief as to all other  
3 matters, complain and alleges as follows:

4 **NATURE OF THE ACTION**

5 1. Plaintiff Gupta brings this Class Action Complaint against Defendant Apple, Inc.  
6 ("Apple" or "Defendant") for its unlawful collection of information correlated to its customer's  
7 geolocation.

8 2. Apple manufactures the popular smartphone, the iPhone. Apple also developed  
9 the proprietary software used to operate the iPhone.

10 3. By default, geolocation information is regularly collected from customers'  
11 iPhones and transmitted to Apple's servers.

12 4. Through its documentation and public statements, Apple has consistently  
13 maintained that iPhone customers who object to having their geolocation collected by Apple can  
14 manually turn off the "Locations Services" function through the device's settings.

15 5. However, in clear contradiction to the company's assertions above, Apple  
16 intentionally designed the iPhone to regularly transmit information correlated to users'  
17 geolocation to Apple's servers, *after a customer turns "Off" Locations Services*. See, iPhone  
18 Geolocation Investigation Report (the "Report"), attached hereto as **Exhibit A**.

19 6. As a result, iPhone users who seek to preserve their privacy have been deceived  
20 into a false sense of security. Apple continues to collect information about iPhone users'  
21 locations, even after these customers have expressly denied Apple access to their mobile devices.

22 7. Not only do Apple's actions demonstrate a wholesale disregard for consumers'  
23 privacy rights, Apple's practice of collecting this data without permission violates numerous  
24 state and federal laws.

25 **PARTIES**

26 8. Plaintiff Gupta is a natural person and citizen of Pennsylvania.  
27  
28

9. Defendant Apple, Inc. is a California corporation with its principal place of business at 1 Infinite Loop, Cupertino, California 95014.

### **JURISDICTION AND VENUE**

10. This Court has subject matter jurisdiction over Plaintiff's claims arising under the laws of the United States pursuant to 28 U.S.C. § 1331, and, as to all other claims, pursuant to 28 U.S.C. § 1367.

11. This Court has personal jurisdiction over Apple because it maintains its corporate headquarters in this District and the improper conduct alleged in the Complaint occurred in, was directed and/or emanated from California.

12. This Court is an appropriate venue for the adjudication of this controversy because a substantial part of the events giving rise to Plaintiff's claims occurred in this District.

### **INTRADISTRICT ASSIGNMENT**

13. Pursuant to Civil Local Rule 3-2(e), this case shall be assigned to the San Jose Division.

### **FACTUAL BACKGROUND**

#### **I. Apple Stands to Profit from Collecting its Customers' Location Data**

14. As New York Times writer Miguel Hefit aptly put it, "you may not know it, but if you carry a smartphone in your pocket, you are probably doing unpaid work for Apple."<sup>1</sup>

15. Indeed, Apple is slowly building a comprehensive database containing information about cellular towers and wireless networks in order to more accurately deploy targeted advertisements to mobile phone users in the future. The mobile phone advertising market is projected to become a \$2.5 billion dollar industry by 2015.

16. In order to collect the information for the database described above, Apple designed the iPhone to constantly collect and send geolocation data to Apple's servers, including information about nearby cell towers and wireless networks.

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<sup>1</sup> Apple and Google Use Location Data to Map the World, <http://www.nytimes.com/2011/04/26/technology/26locate.html> (last visited April 28, 2011).

1 17. Accordingly, consumers' iPhones transmit geolocational data to Defendant on a  
2 routine basis.

3 **II. Apple Promises Not to Collect Geolocation Data About its Customers Without**  
4 **User Consent**

5 18. In a July 2010 letter to Rep. Ed Markey and Rep. Joe Barton, Apple asserted that  
6 "customers have always had the ability to turn "Off" all location-based service capabilities with a  
7 single "On/Off" toggle switch ... [if] customers toggle the switch to "Off," they may not use  
8 location-based services, and no location-based information will be collected."<sup>2</sup>

9 19. More recently, under increasing scrutiny over failing to respect the privacy of its  
10 customers, Apple's senior vice president of iPhone software, Scott Forstall, stated that "the  
11 company doesn't allow apps, including its own, to use location data without the user's consent."<sup>3</sup>

12 20. Unfortunately for consumers, the statements above ring hollow in light of the  
13 facts presented below.

14 **III. Apple Breaks its Promise**

15 21. Through his attorneys, Plaintiff has engaged an independent security expert to  
16 determine whether Apple collects location information from iPhone users without consent. (Ex.  
17 A.)

18 22. The research detailed in the Report clearly shows that, even after an iPhone user  
19 turns off the Location Services function and despite Apple's statements to the contrary, the  
20 device continues to transmit information to Apple's servers revealing the closest cellular tower  
21 and wireless network to the user. (Ex. A.)

22  
23  
24  
25 <sup>2</sup> Apple Letter, <http://www.scribd.com/doc/54054316/Apple-s-Letter-do-Rep-Ed-Markey-and-Joe-Barton>  
(last visited April 27, 2011).

26 <sup>3</sup> Jobs Tries to Calm iPhone Imbroglio,  
27 <http://online.wsj.com/article/SB10001424052748703367004576288790268529716.html> (last visited April 27,  
28 2011).



23. Even more shocking, the information collected and sent from the user's iPhone to Apple can easily be inputted into a publicly searchable database, which in turn reveals a very precise estimate of the user's exact location. (Ex. A.)

24. As a result, Apple—or anyone with access to this data—is able to approximate the exact location of thousands, if not millions, of United States citizens, even after these users unequivocally denied Defendant authorization to determine their whereabouts.

#### FACTS RELATING TO PLAINTIFF

25. Plaintiff Gupta owns an iPhone and has, since purchasing the device, turned his Location Services off.

26. Plaintiff Gupta's iPhone transmitted location data to Apple without his consent.

#### CLASS ALLEGATIONS

27. **Definition of the Class:** Plaintiff Gupta brings this action pursuant to Fed. R. Civ. P. 23(b)(2) and (3) on behalf of himself and a Class of similarly situated individuals, defined as follows:

All individuals and entities in the United States and its territories that have turned off Location Services on their iPhones and unwittingly transmitted location data to Apple's servers.

Excluded from the Class are 1) Defendant, Defendant's agents, subsidiaries, parents, successors, predecessors, and any entity in which the Defendant or their parents have a controlling interest and their current and former employees, officers, and directors, 2) the Judge or Magistrate Judge to whom this case is assigned and the Judge's or Magistrate Judge's immediate family, 3) persons who execute and file a timely request for exclusion, and 4) the legal representatives, successors, or assigns of any such excluded person.

28. **Numerosity:** The exact number of the members of the Class is unknown and is not available to Plaintiff at this time, but individual joinder in this case is impracticable. The

1 Class consists of millions of individuals and other entities. Class members can be easily  
 2 identified through Defendant's records and public records.

3       29.     **Commonality:** There are many questions of law and fact common to the claims  
 4 of Plaintiff and the other members of the Class, and those questions predominate over any  
 5 questions that may affect individual members of the Class. Common questions for the Class  
 6 include but are not limited to the following:

7           (a)     whether Apple continues to collect location data from iPhones even after  
 8 the user turns "Off" the Locations Services function;

9           (b)     whether Apple profits, or intends to profit from, the collection of  
 10 geolocation data described more fully herein;

11          (c)     whether Apple's conduct described herein violated the Stored  
 12 Communications Act (18 U.S.C. § 2701, *et seq.*);

13          (d)     whether Apple's conduct described herein violated the Electronic  
 14 Communications Privacy Act (18 U.S.C. §§ 2510, *et seq.*);

15          (e)     whether Apple's conduct described herein violated the Unfair Competition  
 16 Law (Cal. Bus. & Prof. Code § 17200, *et seq.*);

17          (f)     whether Apple has been unjustly enriched by Plaintiff and the Class;

18          (g)     whether Apple has breached its fiduciary duty to Plaintiff and the Class.

19       30.     **Typicality:** The factual and legal bases of Apple's liability to Plaintiff and to the  
 20 other members of the Class are the same and resulted in injury to Plaintiff and all of the other  
 21 members of the Class. Plaintiff and the other members of the Class have all suffered harm as a  
 22 result of Apple's wrongful conduct

23       31.     **Adequate Representation:** Plaintiff will fairly and adequately represent and  
 24 protect the interests of the Class members, and have retained counsel competent and experienced  
 25 in complex class actions. Plaintiff has no interest antagonistic to those of the Class and  
 26 Defendant has no defenses unique to Plaintiff.

1        32.     **Predominance and Superiority:** This class action is appropriate for certification  
 2 because class proceedings are superior to all other available methods for the fair and efficient  
 3 adjudication of this controversy, since joinder of all members is impracticable. The damages  
 4 suffered by the individual members of the Class will likely be relatively small, especially given  
 5 the burden and expense of individual prosecution of the complex litigation necessitated by the  
 6 actions of Defendant. It would be virtually impossible for the individual members of the Class to  
 7 obtain effective relief from the misconduct of Defendant. Even if members of the Class  
 8 themselves could sustain such individual litigation, it would still not be preferable to a class  
 9 action, because individual litigation would increase the delay and expense to all parties due to the  
 10 complex legal and factual controversies presented in this Complaint. By contrast, a class action  
 11 presents far fewer management difficulties and provides the benefits of single adjudication,  
 12 economy of scale, and comprehensive supervision by a single court. Economies of time, effort,  
 13 and expense will be fostered and uniformity of decisions will be ensured.

14        33.     **Policies Generally Applicable to the Class:** This class action is also appropriate  
 15 for certification because Defendant has acted or refused to act on grounds generally applicable to  
 16 the Class, thereby making appropriate final injunctive relief or corresponding declaratory relief  
 17 with respect to the Class as a whole. The policies of the Defendant challenged herein apply to  
 18 and affect all members of the Class uniformly, and Plaintiff's challenge of these policies hinges  
 19 on Defendant's conduct, not on facts or law applicable only to Plaintiff.

20                                    **FIRST CAUSE OF ACTION**  
 21                                    **Violations of the Stored Communications Act**  
     **(18 U.S.C. § 2701, *et seq.*)**  
     **(On Behalf of Plaintiff and the Class)**

22        34.     Plaintiff incorporates the foregoing allegations as if fully set forth herein.

23        35.     The Electronic Communications Privacy Act, 18 U.S.C. § 2510 *et seq.* (the  
 24 "ECPA") broadly defines an "electronic communication" as "any transfer of signs, signals,  
 25 writing, images, sounds, data, or intelligence of any nature transmitted in whole or in part by a  
 26 wire, radio, electromagnetic, photoelectronic or photooptical system that affects interstate or  
 27

1 foreign commerce..." 18 U.S.C. § 2510(12). The Stored Communications Act (the "SCA")  
2 incorporates this definition.

3 36. Pursuant to the ECPA and the SCA, "electronic storage" means any "temporary  
4 storage of a wire or electronic communication incidental to the electronic transmission thereof."  
5 18 U.S.C. § 2510(17)(A). This type of electronic storage includes communications in  
6 intermediate electronic storage that have not yet been delivered to their intended recipient.

7 37. The SCA mandates, among other things, that it is unlawful for a person to obtain  
8 access to stored communications on another's computer system without authorization. 18 U.S.C.  
9 § 2701.

10 38. Congress expressly included provisions in the SCA to address this issue so as to  
11 prevent "unauthorized persons deliberately gaining access to, and sometimes tampering with,  
12 electronic or wire communications that are not intended to be available to the public." Senate  
13 Report No. 99-541, S. REP. 99-541, 35, 1986 U.S.C.C.A.N. 3555, 3589.

14 39. Apple has violated 18 U.S.C. § 2701(a)(1) because it intentionally accessed  
15 consumers' communications without authorization and obtained, altered, or prevented authorized  
16 access to a wire or electronic communication while in electronic storage by collecting location  
17 data from Plaintiff and the Class's iPhones after Locations Services was turned "Off."  
18 Defendant had actual knowledge of, and benefited from, this practice.

19 40. Additionally, Defendant has violated 18 U.S.C. § 2701(a)(2) because it  
20 intentionally exceeded authorization to access consumers' communications and obtained, altered,  
21 or prevented authorized access to a wire or electronic communication while in electronic storage  
22 by collecting location data from Plaintiff and the Class's iPhones after Locations Services was  
23 turned "Off." Defendant had actual knowledge of, and benefited from, this practice.

24 41. As a result of Defendant's conduct described herein and its violation of § 2701,  
25 Plaintiff and the Class have suffered injuries. Plaintiff, on his own behalf and on behalf of the  
26  
27  
28



1 Class, seeks an order enjoining Defendant's conduct described herein and awarding himself and  
 2 the Class the maximum statutory and punitive damages available under 18 U.S.C. § 2707.

3 **SECOND CAUSE OF ACTION**  
 4 **Violations of the Electronic Communications Privacy Act**  
 5 **(18 U.S.C. § 2510, *et seq.*)**  
 6 **(On Behalf of Plaintiff and the Class)**

7 42. Plaintiff incorporates the forgoing allegations as if fully set forth herein.

8 43. The Electronic Communications Privacy Act, 18 U.S.C. § 2510 *et seq.* (the  
 9 "ECPA") broadly defines an "electronic communication" as "any transfer of signs, signals,  
 10 writing, images, sounds, data, or intelligence of any nature transmitted in whole or in part by a  
 11 wire, radio, electromagnetic, photoelectronic or photooptical system that affects interstate or  
 12 foreign commerce..." 18 U.S.C. § 2510(12).

13 44. The ECPA defines "electronic communications system" as any wire, radio,  
 14 electromagnetic, photooptical or photoelectronic facilities for the transmission of wire or  
 15 electronic communications, and any computer facilities or related electronic equipment for the  
 16 electronic storage of such communications. 18 U.S.C. § 2510(14).

17 45. The ECPA broadly defines the contents of a communication. Pursuant to the  
 18 ECPA, "contents" of a communication, when used with respect to any wire, oral, or electronic  
 19 communications, include any information concerning the substance, purport, or meaning of that  
 20 communication. 18 U.S.C. § 2510(8). "Contents," when used with respect to any wire or oral  
 21 communication, includes any information concerning the identity of the parties to such  
 22 communication or the existence, substance, purport, or meaning of that communication. The  
 23 definition thus includes all aspects of the communication itself. No aspect, including the identity  
 24 of the parties, the substance of the communication between them, or the fact of the  
 25 communication itself, is excluded. The privacy of the communication to be protected is intended  
 26 to be comprehensive.

1           46. Defendant's conduct violated 18 U.S.C. § 2511(1)(a) because Defendant  
2 intentionally intercepted and endeavored to intercept Plaintiff's and Class Members' electronic  
3 communications to, from, and within their iPhones.

4           47. Defendant's conduct violated 18 U.S.C. § 2511(1)(d) because Defendant used and  
5 endeavored to use the contents of Plaintiff's and Class Members' electronic communications to  
6 profit from its unauthorized collection and sale, knowing and having reason to know that the  
7 information was obtained through interception in violation of 18 U.S.C. § 2511(1).

8           48. Defendant intentionally obtained and/or intercepted, by device or otherwise, these  
9 electronic communications, without the knowledge, consent or authorization of Plaintiff or the  
10 Class.

11           49. Plaintiff and the Class suffered harm as a result of Defendant's violations of the  
12 ECPA, and therefore seek (a) preliminary, equitable and declaratory relief as may be appropriate,  
13 (b) the sum of the actual damages suffered and the profits obtained by Defendant as a result of  
14 their unlawful conduct, or statutory damages as authorized by 18 U.S.C. § 2520(2)(B),  
15 whichever is greater, (c) punitive damages, and (d) reasonable costs and attorneys' fees.

### 16                                   **THIRD CAUSE OF ACTION**

#### 17                                   **Violation of California's Unfair Competition Law** 18                                   **Cal. Bus. & Prof. Code § 17200, *et seq.*** 19                                   **(On Behalf of Plaintiff and the Class)**

20           50. Plaintiff incorporates the foregoing allegations as if fully set forth herein.

21           51. California's Unfair Competition Law ("UCL"), Cal. Bus. & Prof. Code § 17200,  
22 *et seq.*, protects both consumers and competitors by promoting fair competition in commercial  
23 markets for goods and services.

24           52. The UCL prohibits any unlawful, unfair or fraudulent business act or practice. A  
25 business practice need only meet one of the three criteria to be considered unfair competition.  
26 An unlawful business practice is anything that can properly be called a business practice and that  
27 at the same time is forbidden by law.  
28

53. Apple has violated the fraudulent prong of the UCL in that Defendant continues to collect geolocation data from its customers, in clear contradiction to its assertions to honor users' decision to turn "Off" Location Services.

54. Apple has violated the unfair prong of the UCL in that, Defendant does now, or plans in the future to, profit from Plaintiff and the Class's geolocation data, although they attempted to prevent Apple from accessing that information.

55. Apple has violated the unlawful prong of the UCL in that Defendant's conduct violated the Stored Communications Act (18 U.S.C. § 2701 *et seq.*) and the Electronic Communications Privacy Act (18 U.S.C. § 2510 *et seq.*).

56. Pursuant to Cal. Bus. & Prof. Code § 17203, Plaintiff seeks an order of this Court permanently enjoining Apple from continuing to engage in the unfair and unlawful conduct described herein. Plaintiff seeks an order requiring Defendant to (1) immediately stop the unlawful practices stated in this Complaint; (2) pay attorney's fees, and costs pursuant to Cal. Code Civ. Proc. § 1021.5.

**FOURTH CAUSE OF ACTION**  
**Unjust Enrichment**  
**(On Behalf of Plaintiff and the Class)**

57. Plaintiff incorporates the foregoing allegations as if fully set forth herein.

58. Plaintiff and members of the Class conferred a monetary benefit on Defendant by purchasing an iPhone from Apple that Defendant claimed would not transmit geolocation data after the Location Services function was turned "Off." Defendant received and retained money through this transaction and by developing a database of location data collected from Plaintiff and the Class as a result of the unlawful and/or wrongful conduct alleged herein.

59. Defendant appreciates or has knowledge of such benefit.

60. Under principles of equity and good conscience, Defendant should not be permitted to retain the money obtained by selling information about Plaintiff and members of the Class, which Defendant has unjustly received as a result of its unlawful actions.

1           61. Accordingly, Plaintiff and the Class seek full disgorgement and restitution of any  
2 amounts Apple has retained as a result of the unlawful and/or wrongful conduct alleged herein.

3                                   **FIFTH CAUSE OF ACTION**  
4                                   **Breach of Fiduciary Duty**  
5                                   **(On Behalf of Plaintiff and the Class)**

6           62. Plaintiff incorporates the foregoing allegations as if fully set forth herein.

7           63. Because Apple was entrusted to honor Plaintiff's and the Class's right to privacy,  
8 Defendant owed a fiduciary duty to Plaintiff and the Class to (a) discontinue the collection of  
9 location data from its customer's iPhones after the user turned "Off" the Location Services  
10 function.

11           64. Defendant breached its fiduciary duty to Plaintiff and Class members by:

- 12                   a) Failing to discontinue collection of location data from its customers'  
13 iPhones after users turned "Off" the Location Services function.  
14                   b) Failing to act in compliance with the Stored Communications Act (18  
15 U.S.C. § 2701, *et seq.*), Electronic Communications Privacy Act (18  
16 U.S.C. § 2510, *et seq.*).

17           65. Under principles of equity and good conscience, Defendant should not be  
18 permitted to retain the money obtained by selling information about Plaintiff and members of the  
19 Class to third parties, which Defendant has received as a result of breaching its fiduciary duties.

20           66. Accordingly, Plaintiff and the Class seek full disgorgement and restitution of any  
21 amounts Apple has retained as a result of the unlawful and/or wrongful conduct alleged herein.

22                                   **SIXTH CAUSE OF ACTION**  
23                                   **Breach of Contract**  
24                                   **(On Behalf of Plaintiff and the Class)**

25           67. Plaintiff incorporates the foregoing allegations as if fully set forth herein.

26           68. Apple requires all iPhone users to agree to its Terms and Conditions before using  
27 their iPhone.

28           69. Apple's Terms and Conditions state:



Location Data: Apple ... may provide certain services through your iPhone that rely upon location information. To provide these services, where available, Apple ... may transmit, collect, maintain, process and use your location data, including the real-time geographic location of your iPhone ... By using any location-based services on your iPhone, you agree and consent to Apple's ... transmission, collection, maintenance, processing and use of your location data to provide such products and services. *You may withdraw consent at any time by ... turning off the Location Services setting on your iPhone[.]*

(Terms and Conditions, ¶ 4(b)) (emphasis added.)

70. At all relevant times, Plaintiff's Location Services was turned "Off."

71. Despite the fact that Plaintiff withdrew his consent pursuant to Paragraph 4(b) of Apple's iPhone Terms and Conditions, Apple continued to transmit geographic location information from his iPhone.

72. Apple's transmission of Plaintiff's geographical location information without Plaintiff's consent constitutes a material breach of the contract.

73. As a result of the breach, Plaintiff suffered, and will continue to suffer, actual and pecuniary harm including, but not limited to, anxiety, emotional distress, and loss of privacy, as well as, other economic and non-economic losses.

#### PRAYER FOR RELIEF

WHEREFORE, Plaintiff, individually and on behalf of the Class, prays for the following relief:

A. Certify this case as a class action on behalf of the Class defined above, appoint Arun Gupta as class representative, and appoint his counsel as class counsel;

B. Declare that Apple's actions, as described herein, violate the Stored Communications Act (18 U.S.C. § 2701, *et seq.*), Electronic Communications Privacy Act (18 U.S.C. § 2510, *et seq.*), and the California Unfair Competition Law (Cal. Bus. & Prof. Code § 17200, *et seq.*);

C. Award injunctive and other equitable relief as is necessary to protect the interests of the Class, including, *inter alia*: (i) an order prohibiting Apple from engaging in the wrongful

1 and unlawful acts described herein; and (ii) requiring Apple to stop collecting geolocation data  
2 from its customers' iPhones after the user has turned "Off" Location Services;

3 D. Award damages, including statutory damages of \$1,000 per violation under the  
4 Stored Communications Act, 18 U.S.C. § 2707(c), and punitive damages where applicable, to  
5 Plaintiff and the Class in an amount to be determined at trial;

6 E. Award Plaintiff and the Class their reasonable litigation expenses and attorneys'  
7 fees;

8 F. Award Plaintiff and the Class pre- and post-judgment interest, to the extent  
9 allowable; and

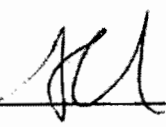
10 G. Award such other and further relief as equity and justice may require.

11 **JURY TRIAL**

12 Plaintiff demands a trial by jury for all issues so triable.

13  
14 Dated: April 28, 2011

Respectfully submitted,

15  
16 By: /s/ Sean Reis   
17 Sean Reis  
One of the Attorneys for Plaintiff

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# EXHIBIT A

Research by Samy Kamkar

[samy@samy.pl](mailto:samy@samy.pl)

<http://samy.pl>

April 27, 2011

#### Summary:

My research has shown that iPhone devices are sending cellular tower information and Wi-Fi BSSID addresses to Apple regardless of whether or not "Location Services" is set to "On" or "Off".

Test device: CDMA iPhone 4 on activated Verizon Wireless account

Further tests were ran on a GSM iPhone 3G on an activated AT&T account which displayed similar results.

When the iPhone 4 has "Location Services" set to "Off" under the Settings->General section, it continues to send packets that can be decoded to information that can easily lead to accurate coordinates of the device.

#### Example packets:

4/27/2011 12:44:49 PM PST:

iPhone 4 sends HTTPS POST to <https://gs-loc.apple.com/clls/wloc>

Content (decrypted from SSL):

```
00000000 00 01 00 05 65 6e 5f 55 53 00 00 00 0b 34 2e 32      en_US      4.2
00000010 2e 36 2e 38 45 32 30 30 00 00 01 00 00 00 1a      .6.8E200
00000020 18 00 20 00 aa 01 13 08 b6 02 18 02 20 34 28 c2      4(
00000030 0b 38 02 40 00 48 a9 03 50 5c      8 e H P\
```

4/27/2011 12:44:50 PM PST:

iPhone 4 sends HTTPS POST to <https://gs-loc.apple.com/clls/wloc>

Content (decrypted from SSL):

```
00000000 00 01 00 05 65 6e 5f 55 53 00 00 00 0b 34 2e 32      en_US      4.2
00000010 2e 36 2e 38 45 32 30 30 00 00 01 00 00 00 bb      .6.8E200
00000020 12 12 0a 10 30 3a 32 34 3a 33 36 3a 61 64 3a 63      0:24:36:ad:c
00000030 32 3a 61 33 12 13 0a 11 33 34 3a 65 66 3a 34 34      2:a3 34:ef:44
00000040 3a 65 39 3a 66 31 3a 37 31 12 12 0a 10 30 3a 31      :e9:f1:71 0:1
00000050 62 3a 66 63 3a 32 31 3a 37 36 3a 65 36 12 12 0a      b:fc:21:76:e6
00000060 10 30 3a 31 65 3a 38 63 3a 62 38 3a 32 30 3a 66      0:1e:8c:b8:20:f
00000070 33 12 12 0a 10 30 3a 32 34 3a 33 37 3a 64 38 3a      3 0:24:37:d8:
00000080 37 38 3a 35 30 12 13 0a 11 33 30 3a 34 36 3a 39      78:50 30:46:9
00000090 61 3a 34 34 3a 62 65 3a 35 33 12 11 0a 0f 30 3a      a:44:be:53 0:
000000a0 31 65 3a 38 63 3a 63 64 3a 65 3a 35 39 12 13 0a      1e:8c:cd:e:59
000000b0 11 31 30 3a 39 61 3a 64 64 3a 38 34 3a 34 65 3a      10:9a:dd:84:4e:
000000c0 62 37 12 13 0a 11 31 36 3a 39 61 3a 64 64 3a 38      b7 16:9a:dd:8
000000d0 34 3a 34 65 3a 62 37 18 00 20 00      4:4e:b7
```

The first 32 bytes of both packets include unknown options as well as UTF-encoded locale (country and language), UTF-encoded version information about the firmware of the iPhone (4.2.6.8E200), and the unknown values 1 (short), 1 (int), and the length of the data to follow (int).



In the first packet, all data after the first 32 bytes decodes to cellular tower information once decoded via Google's protocol buffer format:

```
3: 0
4: 0
21 {
  1: 310
  3: 2
  4: 52
  5: 1474
  7: 2
  8: 0
  9: 425
  10: 92
}
```

21:1 = MCC

21:2 = MNC (missing on CDMA iPhones, sent on GSM iPhones)

21:3 = Cell ID

21:4 = LAC

In the second packet, all data after the first 32 bytes decodes to unique wi-fi BSSID addresses once decoded via Google's protocol buffer format:

```
2 {
  1: "0:24:36:ad:c2:a3"
}
2 {
  1: "34:ef:44:e9:f1:71"
}
2 {
  1: "0:1b:fc:21:76:e6"
}
2 {
  1: "0:1e:8c:b8:20:f3"
}
2 {
  1: "0:24:37:d8:78:50"
}
2 {
  1: "30:46:9a:44:be:53"
}
2 {
  1: "0:1e:8c:cd:e:59"
}
2 {
  1: "10:9a:dd:84:4e:b7"
}
```

```

2 {
  1: "16:9a:dd:84:4e:b7"
}
3: 0
4: 0

```

All of these BSSIDs can then be taken and plugged into a public database, such as Google's freely available geolocation API, in order to locate the mobile device.

You can test this here:

<http://samy.pl/androidmap/>

You can see how accurate the results are by inputting those into the website and comparing the results with the actual location of the device. Here are direct links demonstrating this:

<http://samy.pl/androidmap/index.php?mac=0%3A24%3A36%3Aad%3Ac2%3Aa3&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=34%3Aef%3A44%3Ae9%3Af1%3A71&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=0%3A1b%3Afc%3A21%3A76%3Ae6&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=0%3A1e%3A8c%3Ab8%3A20%3Af3&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=0%3A24%3A37%3Ad8%3A78%3A50&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=30%3A46%3A9a%3A44%3Abe%3A53&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=0%3A1e%3A8c%3Acd%3Ae%3A59&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=10%3A9a%3Add%3A84%3A4e%3Ab7&commit=Probe>

<http://samy.pl/androidmap/index.php?mac=16%3A9a%3Add%3A84%3A4e%3Ab7&commit=Probe>

In all cases, the accuracy of the mapping was within a few buildings (when verifying with satellite view) easily allowing one to determine that the mobile device was in the area. Further triangulation based off of comparing which networks were seen or averaging the location of the wifi networks can also lead to further information on the location of the phone.

The iPhone 4 is clearly sending information that can lead to accurate location information of the mobile device regardless of whether the "Location Services" feature is enabled or disabled. Similar packets with similar content is sent while "Location Services" is enabled.

Screenshot of the Settings->General and Settings->General->Location Services screens while in "Location Services off" mode:

